REMARKS

This paper is submitted in response to the Office Action dated June 4, 2002, which was issued in the above-identified application. Applicants respectfully request reconsideration of the above-identified application in light of the amendments and remarks presented in the instant Amendment. Applicants request a two-month extension of time to November 4, 2002 and enclose the fee required under 37 C.F.R. §1.17(a)(1). Applicants respectfully request reconsideration of the above-identified application in view of the instant amendments and remarks.

Claims 1-9 are pending. Claims 1-3, 5, 7, and 9 have been amended. Rewritten claims appear in the preceding "IN THE CLAIMS" section. Attached hereto as **APPENDIX A** is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"VERSION WITH MARKINGS TO SHOW CHANGES MADE."** and is only included for the Examiner's convenience. Should any discrepancies be discovered, the version presented in the preceding **"IN THE SPECIFICATION"** section shall take precedence.

Claims 1-3, 5, 7, and 9, as amended herein, are fully supported by the specification as filed at, *inter alia,* original claims 1-3, 5, 7 and 9 and therefore do not constitute new matter.

Claims are Nonobvious Over the Cited Documents

Claims 1-9 have been rejected under 35 U.S.C. §103(a) as allegedly obvious over U.S. Patent No. 6,235,407 B1, which is an English version of the Japanese PCT WO98/45114 to Ogata (hereinafter "Ogata") in view of U.S. Patent No. 5,612,394 to Pfeil (hereinafter "Pfeil).

The Examiner has alleged that Ogata discloses a steel plate for a highly corrosion resistant fuel tank, that the amount of amine added to the epoxy/phenoxy resin is between 0.2 and 1 mole per equivalent of the oxyrane ring in the epoxy/phenoxy, that the molecular weight of the amine-modified phenoxyepoxy has an effect on the resultant properties of the film, that the base resin used to coat the other chemical conversion layer should have at least one functional group selected from the hydroxyl groups, isocyanate groups, carboxyl groups, glycidyl groups, and amino groups, that adding polytetrafluoroethylene wax to an epoxy resin improves the pressability and workability of the film, and adding colloidal silica to an epoxy resin for the purpose of improving corrosion resistance. The Examiner has acknowledged that Ogata does not disclose a coating fuel tank wherein coating comprises a phenoxy resin having a number average molecular weight between 25-50 thousand, 2-15 phr of melamine resin, 10-20 phr of colloidal silica, 2-10 phr of Teflon-based wax, and 5-10 phr of a plate type metal powder having a particle size between 0.5 and 5 μm, and the dried coating thickness between 1-10 μm. The Examiner has also acknowledged that Ogata does not disclose using melamine as the primary/secondary amine to modify the epoxy/phenoxy resin. However, Examiner has also alleged that Pfeil discloses suitable coatings that have good adhesion to steel. The Examiner concludes that it would have been obvious to one of ordinary skill in the art to use melamine as the primary amine used to modify the phenoxy/epoxy resin taught by Ortega.

Applicants traverse this rejection and assert that the instant claims are patentable over Ogata and Pfeil since these documents fail to suggest or teach a water-born type resin solution comprising the phenoxy resin, melanin resin, colloidal silica resin, metal powder, and characteristics thereof.

To maintain an obviousness rejection, the combination of references must teach or suggest each and every element of Applicant's claim. Neither Ogata nor Pfeil teach or suggest a water-born type resin solution including the colloidal silica and metal powder in a solution. Ogata teaches that the metal powder-containing resin solution is seperate from the silica-containing resin solution including a lubricant, thus resulting in two coated layers including the silica and the metal powder. The resin solution of the present invention provides a water-born type resin solution including the colloidal silica and metal powder in a solution.

Ogata (page 6, line 23) teaches a resin that will become brittle above 90 °C, whereas the present invention discloses a resin wherein the colloidal silica wherein the Tg of the resin is 100 °C.

Ogata (column 13, line 20) discloses a solvent-type resin solution including an organic solvent. The present invention includes a resin solution that is dispersed in water (page 14, line 2) due to the water-solubility of the phenoxy resin. Hence, the present invention is directed to a water-born type resin solution, whereas Ogata discloses a solvent-type resin solution.

Furthermore, Ogata discloses the use of an ethylene-based wax and PTFE-based wax with a particle size of 5μm, whereas the present invention discloses the use of PTFE-based wax at a more restricted size limit of 0.1-3μm.

Applicants, therefore, respectfully request withdrawal of this rejection.

CONCLUSION

Entry of the foregoing amendments and remarks in the above-identified application is respectfully requested. The Applicant believes that the invention defined by the amended claims meets all the requirements for patentability. Withdrawal of all rejections and reconsideration of the amended claims is requested. An allowance is earnestly sought.

The Commissioner is hereby authorized to charge any fees due with this submission to Deposit Account No. 02-4377. Please credit any overpayment of fees associated with this filing to the above-identified deposit account. A duplicate of this page is enclosed.

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APPENDIX A

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

Please replace the paragraph beginning at page 3, line 15 and ending at page 3, line 19 with the following paragraph:

In order to achieve the above objects, the resin solution of the present invention is prepared by mixing a main solution selected from epoxy resin, urethane~~urethan~~ resin, and phenoxy resin~~,~~ melamine resin, colloidal silica, polytetrafluoroethylene ("PTFE")~~tefron~~-based wax, and at least one metallic powder selected from Al, Zn, Mn, Co, Ni, Sn, and SnO.~~:~~

Please replace the paragraph beginning at page 3, line 20 and ending at page 4, line 3 with the following paragraph:

The main solution used in the resin solution of the present invention is a water-soluble phenoxy resin with a number average molecular weight of 25,000 ~~=~~ 50,000. Melamine resin is added as a hardener and the amount is 2 ~~=~~ 15 phr on the basis of the main solution. Also, an amount of colloidal silica is 10 – 20 phr on the basis of the main solution, an amount of PTFE~~tefron~~ wax is 2 - 10 phr on the basis of the main solution, and an amount of metallic powder is 5 ~~=~~ 70 phr on the basis of the main solution.

Please replace the paragraph beginning at page 4, line 4 and ending at page 4, line 6 with the following paragraph:

The PTFE~~tefron~~-based wax added to the resin solution of the present invention is preferably a powder type and particle size of 0.1 ≅ 3 μm. In addition, particle size of the metallic powder is 0.5 ≅ 5μm.

Please replace the paragraph beginning at page 9, line 20 and ending at page 9, line 21 with the following paragraph:

Wax added into resin solution serves as a lubricant to metallic powder. The wax that is preferable to use PTFE~~polytetrafluoroethylene (hereinafter,,"tefron")~~.

Please replace the paragraph beginning at page 9, line 22 and ending at page 10, line 2 with the following paragraph:

Comparing the prior ethylene-based wax, PTFE~~tefron~~-based wax has an excellent slip characteristic of resin coating. In addition, PTFE~~tefron~~-based wax can cover the metallic powder protruded onto resin coating so that it can prevent friction between dye~~die~~ and resin coating while press processing.

Please replace the paragraph beginning at page 10, line 3 and ending at page 10, line 7 with the following paragraph:

The content of PTFE-based~~tefron~~ wax is preferably 2 ≅ 10 phr based on phenoxy resin content. If content of PTFE~~tefron~~ wax is less than 2 phr, it is too small to improve

surface friction coefficient. On the contrary, if content of PTFE~~tefron~~ wax is more than 10 phr, coating adhesion with paint which can be applied into upper resin layer decreases.

Please replace the paragraph beginning at page 10, line 8 and ending at page 10, line 13 with the following paragraph:

A particle size of PTFE~~tefron~~ wax added into resin solution has important effect. A particle size of PTFE~~tefron~~ wax is preferably 0.1 – 3 μm. If the wax size is less than 0.1 μm, the ball-bearing effect based on wax theory decreases in the resin solution. On the contrary, if the wax size is more than 3 μm, the stability of the resin solution decreases and it prevents metallic powder from forming current structure so that conductivity decreases.

Table 1

No.	wax			Quality measurement			
	Type	Particle size(㎛)	Amount (phr)	Friction coefficient	Coating exfoliation	Solution stability	Adhesion
Com. 1	-	-	0	×	△	◎	◎
Com. 2	PTFE ~~Tefron~~	0.1	1	□	□	◎	◎
Ex. A			2	◎	◎	◎	◎
Ex. B			5	◎	◎	◎	◎
Ex. C			10	◎	◎	◎	◎
Com. 3			15	◎	◎	◎	×
Com. 4		0.3	1	□	□	◎	◎
Ex. D			2	◎	◎	◎	◎
Ex. E			5	◎	◎	◎	◎
Ex. F			10	◎	◎	◎	◎
Com. 5			15	◎	◎	◎	△
Com. 6		1.5	1	□	0	◎	◎
Ex. G			2	◎	◎	◎	◎
Ex. H			10	◎	◎	◎	◎
Com. 7			15	◎	◎	◎	×
Com. 8		3	1	□	0	◎	◎
Ex. I			2	◎	◎	◎	◎
Ex. J			10	◎	◎	◎	◎
Com. 9			15	◎	◎	◎	△
Com. 10		5	1	□	0	0	◎
Com. 11			2	◎	◎	□	◎
Com. 12			10	◎	◎	△	◎
Com. 13			15	◎	◎	×	×
Com. 14	Ethylene	0.1	1	□	△	◎	◎
Com. 15			2	0	□	◎	◎
Com. 16			5	◎	□	◎	◎
Com. 17			10	◎	0	◎	◎
Com. 18			15	◎	0	◎	△
Com. 19		0.3	1	0	□	◎	◎
Com. 20			2	0	□	◎	◎
Com. 21			5	◎	□	◎	◎
Com. 22			10	◎	0	◎	◎
Com. 23			15	◎	0	◎	△

As can be seen in table 1, the quality of surface-treated steel sheet of **PTFE**~~teflon~~-based wax is more excellent than that of ethylene-based wax. Particularly, as can be seen from the coating exfoliation results, it is preferable to use a PTFE-based wax with particle size of 0.1 – 3.0 μm and the amount of 2 – 15 phr in order to manufacture steel sheet for fuel tank with improved press processibility.

IN THE CLAIMS

Please amend claim 1 with the following rewritten claim:

1. **(AMENDED)** A resin solution ~~used~~ for preparing resin-coated steel sheet for a fuel tank of an automobile comprising:

a main resin solution selected from **group consisting of** epoxy resin, **urethane**~~urethan~~ resin and phenoxy resin;

melamine resin;

colloidal silica;

PTFE ~~tefron~~-based ~~5~~ wax; and

at least one plate-type metallic powder selected from Al, Zn, Mn, Co, Ni, Sn and SnO.

2. **(AMENDED)** The resin solution of claim 1, wherein said main resin solution is water-soluble phenoxy resin **that is water soluble and has**~~having~~ a number average molecular weight of 25,000 to 50,000;

said melaninemelamine resin is added in the amount of 2 to 15 phr on the basis of said main solution;

said colloidal silica is added in the amount of 10 to 20 phr on the basis of said main solution;

said PTFEtefron-based wax is added in the amount of 2 to 10 phr on the basis 15 of said main solution; and

said metallic powder is added in the amount of 5 to 70 phr on the basis of said main solution.

3. (AMENDED) The resin solution of claim 2, wherein said PTFEtefron-based wax has a particle size of 0.1 – 3 μm.

5. (AMENDED) TheA method of fabricating resin-coated steel sheet for a fuel tank of an automobile comprising the steps of:

coating a resin solution comprising a main resin solution of phenoxy resin having a number average molecular weight of 25,000 to 50,000; 2 to 15 phr of melamine resin on the basis of said main solution; 10 to 20 phr of colloidal silica on the basis of said main solution; 2 to 10 phr of PTFEtefron-based wax on the basis of said main solution; and 5 to 70 phr of at least one plate-type s-metallic powder selected from Al, Zn, Mn, Ni, Sn, and SnO; and

baking drying said resin-coated steel sheet at 140-250°C.

7. (AMENDED) The method of fabricating resin coated steel sheet of claim 6 wherein the particle size of the PTFEtefron-based wax of said resin solution is 0.1 to 3 μm.

9. (AMENDED) A resin-coated steel sheet for a fuel tank of an automobile comprising a main resin solution of water-soluble phenoxy resin having a number average molecular weight of 25,000 to 50,000;

2 to 15 phr of melaninemelamine resin on the basis of said main solution;

10 to 20 phr of colloidal silica on the basis of said main solution;

2 to 10 phr of PTFEtefron-based wax on the basis of said main solution; and

5 to 70 phr of at least one of metallic powder selected from Al, Zn, Mn, Co, Ni, Sn, and SnO on the basis of said main solution and with 0.5 – 5 μm of particle size, said resin solution coated in the thickness of 1 – 10 μm based on dried coating thickness.

CONCLUSION

Entry of the foregoing amendments and remarks in the above-identified application is respectfully requested. The Applicant believes that the invention defined by the amended claims meets all the requirements for patentability. Withdrawal of all rejections and reconsideration of the amended claims is requested. An allowance is earnestly sought.

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